

Summer 2016

## Wrack Lines Spring/Summer 2016

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Sea Grant  
Connecticut

# WRACKLINES

Volume 16, Number 1, Spring/Summer 2016

## CONNECTICUT'S SHELLFISH INITIATIVE

Find out why a bivalve's value  
goes far beyond its ability to satisfy  
human appetites.





Volume 16, No. 1 Spring/Summer 2016

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**UConn**  
UNIVERSITY OF CONNECTICUT

## From the EDITOR

# TOGETHER, WE DO MAKE A DIFFERENCE!

This is a big year for Connecticut's Shellfish Initiative, as it gains momentum. You'll read all about it in this themed issue, with perspectives from many individuals and sectors working to develop the best plan for this resource. This issue contains a wonderful new infographic about our thriving shellfish status, for which we thank Maxine Marcy, designer of *Wrack Lines*, and Tessa Getchis, our shellfish Extension educator.

It's also a big year for Sea Grant nationwide, as we celebrate our 50<sup>th</sup> anniversary! Our Connecticut program has not existed that long, but the wheels of our existence were put in motion then. One of the biggest strengths of Sea Grant is our national network presence, which links experts in more than 300 universities nationwide. We are highlighting some of our best successes and programs this year to raise awareness of what we do for the nation. We've created a new 10-minute video, produced by John Karl of Wisconsin Sea Grant, which you can see on YouTube at <https://youtu.be/6xMW2bX7R88>.



### **Americans love to live and work on the coast, and that's certainly true here in Connecticut.**

Being close to the water offers rewards, and challenges. We've seen disasters of the man-made and natural variety, economic changes and shifting coastal ecosystems that in turn shift the availability of coastal resources. All of these challenges provide an opening for Sea Grant to step in, applying research, education and outreach to study, protect and enhance the use of coastal resources. And, Sea Grant's got a track record. In 2016, we can truly say that Sea Grant has spent 50 years putting science to work for America's coastal communities.

If you want to know more, please see our website <http://seagrant.uconn.edu> and our Facebook and Twitter sites. We have a link to a new video about Connecticut Sea Grant's unique history on our home page. Together, we DO make a difference!

Yours,

*Peg Van Patten*

Peg Van Patten, *Wrack Lines* editor

About our cover:

Molluscs play a vital role in the environment, economy and society.  
Photo: Tessa Getchis



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# CONNECTICUT SHELLFISH BY THE NUMBERS

## HABITAT

**77,000**

total number of acres of shellfish beds



**4** harvested types  
(oysters, clams,  
mussels, bay scallops)



**7** minimum days  
shellfishing areas are  
closed following a significant  
rainfall event

**14** towns with  
recreational  
harvest areas  
open to public

## HARVESTING

**\$30,000,000**

estimated value of commercial harvest



**3** average number of  
growing seasons before  
an oyster can be  
harvested



**41** shellfish  
companies

## AMAZING OYSTERS

**100** million average number of eggs produced  
by a healthy oyster

**1%** of fertilized  
oyster eggs  
that survive to  
maturity

**30** number of  
gallons one  
oyster can  
filter in a day

**800** water  
quality  
sampling  
stations

**\$20** average cost  
for an annual  
recreational shell-  
fishing permit for  
Connecticut resident

**70** calories in a quarter pound  
serving of clams

## SHELLFISH & CONSUMERS



Source: Connecticut Dept. of Agriculture, Bureau of Aquaculture

Sea Grant  
**50**  
YEARS

UConn  
COLLEGE OF AGRICULTURE,  
HEALTH AND NATURAL  
RESOURCES  
EXTENSION



# Selling a Shellfish Story

by Tessa Getchis

Romanticized in countless books and works of art and marketed like a fine wine, oysters have a celebrated reputation. The oyster's value goes far beyond its ability to satisfy human appetites. Oysters have a vital role in the environment, economy and society. Shellfish beds that include oysters, clams, mussels and scallops encompass nearly 80,000 undersea acres or nearly 20% of Long Island Sound. The state's commercial shellfishing and aquaculture industry provides hundreds of maritime and land-based jobs, and recreational shellfishing affords many an opportunity to harvest their own dinner. Shellfish filter and improve water quality, provide homes for marine organisms and protect shorelines from erosion. The oyster, known for its "esteemed reputation for quality" has been so important to the Connecticut economy that in 1989 the General Assembly designated it the state's shellfish.

Over the years, the state's shellfish sectors have received support in many forms, ranging from the construction of three aquaculture-focused high schools, to the rehabilitation of hundreds of acres of oyster beds, and appropriation of funding to construct a state shellfish laboratory in Milford and to hire additional staff to monitor the water quality of shellfish harvest areas. Still, there is more work to be done.

Three years ago, a diverse group of shellfish interest groups, led by Sea Grant and NOAA Fisheries, set out to develop a plan to grow and protect Connecticut's shellfish sectors. The idea was to facilitate a stakeholder-based process to gather ideas and identify specific strategies to this end. There hasn't been consensus on every recommendation, but most have agreed that public awareness about shellfish and shellfisheries is lacking and something should be done to increase visibility.

"Ask around and you get the sense that we have lost our connection to the sea," says Dick Harris, retired director of Harbor Watch, a local water quality monitoring and research program. These words didn't surprise those of us listening to him speak at a recent workshop. A large portion of the shoreline is privatized and access to some areas is limited. Couple that with the fact that the majority of Connecticut shellfish are shipped out of state to Boston and New York, rarely making it to local markets, and you start to realize why people may not know about these marine treasures growing right in our backyard.

Recognizing the need for a better understanding of this situation, Sea Grant recently funded a pilot study to explore what Connecticut citizens know about shellfish production within the state. A mobile display, featuring images and text describing Connecticut's recreational and commercial shellfisheries was created and displayed at shellfish-themed public events in coastal towns. At the same time, attendees were surveyed to gauge their awareness of Connecticut's shellfisheries.

The anonymous survey targeted public attendees at two major maritime events, the Milford Oyster Festival in August 2015 and the Norwalk Oyster Festival in September 2015. These events annually draw nearly 50,000 attendees from Connecticut and beyond. The survey included knowledge-based questions about Connecticut's shellfish sectors. A total of 295 people responded. We sorted the responses by zip code to yield town-specific information. We were surprised to learn that an overwhelming majority of participants were unable to answer all questions correctly, although it was not surprising that individuals from

inland towns scored lower than those living in coastal areas. Interestingly, residents of towns where commercial shellfishing exists scored higher than respondents in all other groups.

There is a silver lining. This work indicated that there exists a great opportunity to increase public awareness. Sea Grant staff plan to use the information from this pilot

study and from a more comprehensive survey planned for later this year to drive future public education campaigns and outreach programs on Connecticut shellfish and shellfisheries.

Many businesses and organizations are already doing their part to bring greater awareness to Connecticut's shellfish and shellfisheries. In this issue, you'll hear about one local restaurant, Mystic Oyster Club, that 'sells the story' by promoting local farming and fishing businesses (see page 7). Several towns host community shellfishing events that allow residents an opportunity to harvest their own shellfish and simultaneously learn about the marine environment (see page 23). An oyster shell recycling program in Fairfield informs restaurant owners and patrons about the value of conserving shell rather than sending it to a landfill (see page 10). If you are feeling hungry, turn to page 8 where you can find out why shellfish are good for your health and page 7 to find a tasty recipe offered by a local chef.

## ABOUT THE AUTHOR

*Tessa Getchis is an Extension Educator with Connecticut Sea Grant and UConn Cooperative Extension. In between digging for clams and slurping oysters, she enjoys working with others to promote Connecticut's shellfish heritage.*

**"The life of man is of no greater importance to the universe than that of an oyster."**

**-David Hume**



The oyster, known for its "esteemed reputation for quality" has been so important to the Connecticut economy that in 1989 the General Assembly designated it the state's shellfish.



Photo: Tessa Getchis



# From Sea to Table Means Fresh is on the Menu

by Katherine Tsantiris



At The Oyster Club in Mystic, owner Dan Meiser has a central motto that underpins his restaurant's innovative use of local ingredients. "Our food has a story," he says. And it's true. Their food tells a holistic story of food production, from farm or sea to plate. Approximately 95% of their produce is sourced from within 50 miles of the restaurant. Executive chef, James Wayman, is known to forage for wild herbs and greens around Connecticut, and their seafood comes almost exclusively from the coast of Connecticut and Rhode Island.

Meiser and Wayman are pushing the boundaries of what is possible at a high-end restaurant by using whole animals and other unlikely ingredients as the star of their dishes. For example, chef Wayman created a dish showcasing sea robin, a species often referred to as a "trash fish" more commonly used for lobster bait. The story here is similar to his other menu options – a local and sustainably harvested meal prepared and presented in an eye-catching and mouth watering recipe.

The oysters and clams served at the restaurant's raw bar are all sourced from southern New England. Oysters – the restaurant's namesake – are always on the menu with four varieties to satisfy customer demand. The oysters are from nearby Noank, Fishers Island, Watch Hill and Ninigret Pond. Meiser says the



market is trending towards a smaller oyster with a higher price tag.

"That's something that Connecticut oyster producers are keenly aware of," says Tessa Getchis, Sea Grant aquaculture extension educator. "Connecticut's minimum oyster harvest size is three inches, and shellfish producers and lawmakers have discussed a reduction in the harvest size to reflect the change in consumer preferences."

Meiser works closely with his oyster and seafood suppliers in the area, and thus has an appreciation of the challenges that they face, such as barriers to entry into the oyster farming industry.

When asked about the future of shellfish production in Connecticut, Meiser said "I hope that Connecticut can one day get to where Rhode Island is now, realizing an exponential growth of small, sustainable farms with low to zero impact on the surrounding environment."

## ABOUT THE AUTHOR

*Katherine Tsantiris has a graduate degree from Yale University and is a John A. Knauss Sea Grant Marine Policy Fellow for 2016. She wrote this while working as an extension program assistant at Connecticut Sea Grant.*

## RECIPE

### Pop Pop's Oyster Stew

- 1 pint of fresh shucked oysters and all the juice
- 1 pint whole milk
- 1 pint heavy cream
- 3 Tbsp unsalted butter
- 1 Tbsp Worcestershire Sauce
- 1 tsp Old Bay seasoning
- 1/4 tsp celery seed
- Salt and pepper to taste

In a sauce pan, bring milk and cream up to simmer and reduce to keep from boiling. In a separate saucepan melt butter over medium heat and add Worcestershire, and seasonings. Add oysters and juice to pan with seasonings and carefully warm oysters just until the edges start to curl. Turn off heat and immediately spoon buttery oysters into warm serving bowls. Ladle warmed milk and cream over the top, serve immediately.





# Shellfish – tasty and healthy

by Linda T. Drake

What could be more delicious than a bowl of Connecticut clam chowder? (Some call it Rhode Island clam chowder, but my grandfather used to make it and he was a die-hard Nutmegger!) Or braised bay scallops with lemon and garlic? To make the experience even better, shellfish – mollusks (clams, scallops, mussels, oysters) and crustaceans (lobster, crab, shrimp, crayfish) – are good for you.\*

Shellfish are low in calories, low in fat, high in protein and contain potassium, zinc, iron and several vitamins. Molluscan shellfish are also a source of heart-healthy Omega-3 fatty acids. If you cook shellfish in lots of butter, or deep fry it, then it will be high in calories and may also be high in saturated fat. Your cooking methods or choices you make when eating out, can affect the healthfulness of shellfish or any foods you eat. However, for most people, everything in moderation – even fried clams! But I prefer my grandfather's clear chowder as a tasty, healthier alternative to creamy New England Clam Chowder. Here's one like it online: <http://bit.ly/1Ql3ytv>

**\*IMPORTANT NOTE:** Raw shellfish can carry viruses and bacteria that may cause severe illness. According to the Connecticut Department of Public Health immune compromised people and those with certain medical conditions are at the greatest risk for foodborne disease. This is especially important for people with liver disease, cancer, diabetes, older adults, pregnant women and young children. Shellfish should be safely handled and thoroughly cooked. When purchasing or harvesting shellfish, bring a cooler and ice and get them refrigerated, at less than 45°F, as soon as possible. The CT DPH advises that to prevent illness shellfish should be cooked to an internal temperature of 145°F for at least 15 seconds.

For more information on safe handling, storage and cooking practices for shellfish, download: <http://s.uconn.edu/mollusks>

## ABOUT THE AUTHOR

*Linda Drake is a nutrition specialist with the UConn Department of Nutritional Sciences.*



## NUTRITIONAL FACTS

# How do shellfish measure up?

### NORTHERN QUAHOG (raw) <sup>1</sup>

## Nutrition Facts

Serving Size (100g)

Amount Per Serving

**Calories** 70 Calories from Fat 9

**% Daily Values\***

**Total Fat** 0.9g **1%**

Saturated Fat 0g **0%**

Trans Fat 0g

**Cholesterol** 40mg **13%**

**Sodium** 57mg **2%**

**Total Carbohydrate** 0g **0%**

Dietary Fiber 0g **0%**

Sugars 0g

**Protein** 16g **32%**

Calcium 4% Iron 20%

\*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

### EASTERN OYSTER (farmed, raw) <sup>2</sup>

## Nutrition Facts

Serving Size (100g)

Amount Per Serving

**Calories** 59

**% Daily Values\***

**Total Fat** 1.55g **2%**

Saturated Fat 0.443g **2%**

Trans Fat 0g

**Cholesterol** 25mg **8%**

**Sodium** 178mg **7%**

**Total Carbohydrate** 5.53g **2%**

Dietary Fiber 0g **0%**

Sugars 0g

**Protein** 5.22g **10%**

Calcium 4.4% Iron 32.1%

\*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

## Shellfish are...

A low-fat source of protein

High in micro-nutrients (selenium, zinc, iodine, and copper)

Sources of omega-3 fatty acids

A delicious and sustainable seafood that is grown locally here in Connecticut

### CHICKEN (whole Chicken, meat only, cooked) <sup>2,3</sup>

## Nutrition Facts

Serving Size (100g)

Amount Per Serving

**Calories** 167

**% Daily Values\***

**Total Fat** 6.6g **10%**

Saturated Fat 1.8g **9%**

Trans Fat 0g

**Cholesterol** 75mg **25%**

**Sodium** 75mg **3%**

**Total Carbohydrate** 0g **0%**

Dietary Fiber 0g **0%**

Sugars 0g

**Protein** 25g **50%**

Calcium 1.5% Iron 6.7%

\*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

### PORK (fresh, top loin (chops), boneless, separable lean and fat, cooked, braised) <sup>2</sup>

## Nutrition Facts

Serving Size (100g)

Amount Per Serving

**Calories** 200

**% Daily Values\***

**Total Fat** 8.31g **13%**

Saturated Fat 4.34g **22%**

Trans Fat 0g

**Cholesterol** 72mg **24%**

**Sodium** 66mg **3%**

**Total Carbohydrate** 0g **0%**

Dietary Fiber 0g **0%**

Sugars 0g

**Protein** 29.2g **58%**

Calcium 1.2% Iron 4.9%

\*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

### BEEF (ground, unspecified fat content, cooked) <sup>2</sup>

## Nutrition Facts

Serving Size (100g)

Amount Per Serving

**Calories** 240

**% Daily Values\***

**Total Fat** 14.53g **22%**

Saturated Fat 5.6g **28%**

Trans Fat 0g

**Cholesterol** 84mg **28%**

**Sodium** 85mg **4%**

**Total Carbohydrate** 0g **0%**

Dietary Fiber 0g **0%**

Sugars 0g

**Protein** 25.07g **50%**

Calcium 2.5% Iron 14.8%

\*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

### Sources

<sup>1</sup>Eating Shellfish as Part of a Healthy Diet. Safe Seafood Series. Cape Cod Cooperative Extension & Woods Hole Sea Grant.

<sup>2</sup>USDA National Nutrient Database for Standard Reference. <http://ndb.nal.usda.gov/>

<sup>3</sup><http://www.nationalchickencouncil.org/chicken-the-preferred-protein-for-your-health-and-budget/the-nutritional-value-of-chicken/>



# Giving Back to Long Island Sound One Oyster Shell at a Time

## Fairfield Shellfish Commission's Oyster Shell Recycling Program

by Tim Macklin



Labeled oyster shell collection buckets ready to distribute to local restaurants. Photo: Tim Macklin

Sunday mornings have become somewhat of a ritual for my son, Max, and me. We wake up, eat a hearty breakfast, load up the car with empty buckets and head out to local restaurants to collect discarded oyster shells. Some days it's hot, some days it's rainy, some days it's bitter cold, but it never seems to matter what the weather is. Max is always excited to go collecting, I'm always happy to spend that time with him, and he seems to understand that we're doing something that matters to more than just the two of us.

In 2015, the Fairfield Shellfish Commission started a program to revitalize the recreational oyster bed off Sasco Beach in Fairfield. The primary purpose was to provide more oysters for the public harvest; however, the program was equally important to improving our local marine environment. Oysters filter and purify the waters they inhabit, the beds and reefs oysters form create habitats for other marine life, and provide protective barriers that help stabilize shorelines and protect them from erosion.

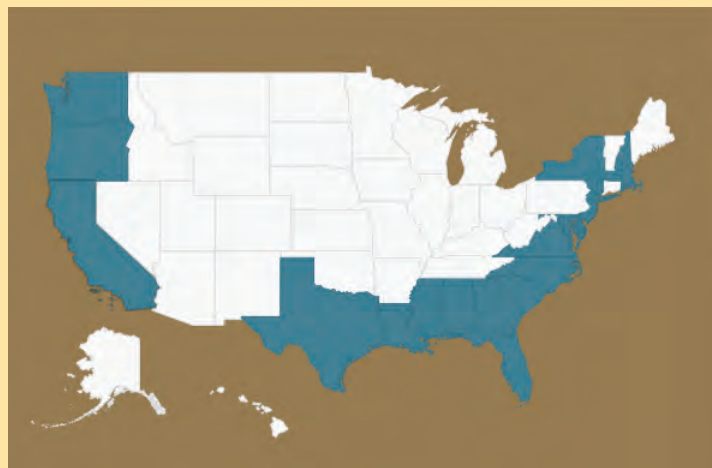
This project would require several things. First, we needed to collect oyster spat. Spat is oyster larvae that have attached to a hard substrate. Oyster shell is the ideal substrate for oyster larvae to attach to. This meant finding a suitable location to suspend bags of oyster shell in the water to collect the spat. We found a spot in Southport Harbor, but needed to draw up plans and acquire permits to hang the bags. Commission member John Short took the lead in planning this endeavor. With the permit process under way, the next phase of the project was collecting lots of oyster shell.

As they are the main building block for the growth of new oysters, we needed to collect several tons of oyster shells. In addition to using the shell to collect spat, we needed to spread shell around the existing recreational oyster bed to promote the growth and development of the new beds.

We first targeted local beaches, but quickly realized there wasn't enough shell available. It was at that point we came

up with an alternate plan. We could utilize the shell being discarded from local restaurants. Not only could we collect the shell needed for the project, but we could also reduce waste that would end up in landfills.

I did some research to find out if there were any existing oyster shell recycling programs in Connecticut, or anywhere else in the U.S. I was surprised to find that Connecticut was one of only four coastal states in the U.S. that does not have



This map shows the states, shaded in blue, that have oyster restoration and shell recycling programs. Graphic courtesy of O.R.P - The Oyster Recovery Partnership.

an organized oyster restoration and shell recycling program. It became evident that if we wanted to collect and recycle oyster shells, we needed to jump right in and get started. I spent some time getting familiar with some of the successful recycling programs: Sink Your Shucks, started by Texas A&M University-Corpus Christi, Texas; S.C.O.R.E, the South Carolina Oyster Restoration and Enhancement; and ORP, the Oyster Recovery Program, a partnership between Maryland, Washington D.C. and Virginia. These well-funded programs are large scale and well supported, even with some full-time staff. While these programs provided us with some



good ideas on how to get started, our limited resources necessitated a creative grassroots operation.

The first item on our oyster shell recycling program “to do list” was to find a suitable storage area away from residents to dry out the shell, since a rather unpleasant aroma can waft from the storage area, especially in the summertime. We were lucky to have been granted access to a location behind the Town Conservation Workshop and worked with the Conservation Department. They partitioned the area with concrete dividers and paved it with asphalt. Storing the shell on a hard paved surface is recommended, but not an absolute necessity. The concrete dividers keep the shell neatly sectioned off and organized.

It’s important to note that most oyster shell recycling programs recommend that the shell “cure,” or dry out, for at least six months before being returned to the water. The curing process kills off any harmful microbes and prevents introducing any potential disease to local waters.

In Fairfield, we have separated our collection area into three bays. This allows us to cure shell and have it ready to go back into the water every three months. The shells we collected from September to December 2015 will be ready to go back in the water in June of 2016. The second collection bay holds shells collected from January to March 2016 and will go back into the water in September. We started storing shell in the third bay in April. Getting the shells back into the water just before or during oyster spawning season (end of July to the beginning on August)

is crucial to ensure the collection of spat and for promoting the growth of new oysters on the deposited shell. The next item on the list was to obtain a substantial amount of collection buckets, which we’d need to leave at restaurants. Fairfield Shellfish Commission President Bob Bilek and member Alison Savona, were able to get the Fairfield Home Depot to donate 50 five-gallon buckets. We created program identification labels for the buckets and were ready to move forward with finding restaurants that would be willing to participate in the project.

I love to eat oysters, so I’m very familiar with all the seafood serving restaurants in Fairfield and neighboring towns. We reached out to four restaurants: Black Rock Oyster Bar and Martel in Fairfield, BRYAC in Bridgeport and The Whelk in Westport. We also recently partnered with Heirloom Restaurant in New Haven.

Recycling oysters requires little effort on the part of the restaurants and reduces their waste removal fees. Almost all restaurants recycle cardboard, glass, plastics, and even cooking oil already, so recycling oyster shell was an easy sell. After explaining how our program worked, every restaurant we approached was excited about the project and more than happy to participate.

The next item up was to coordinate shell pick-ups from the participating restaurants. This does require some time and commitment. Most of the restaurants leave the buckets of shell

at their back door, which allows for after-hours pick-up. Collection needs to be done at least once a week and this can take a couple of hours to transport the shell to the storage area, spread the shell in the storage area, and clean out the buckets.

To keep track of how much shell we have collected, we log into a simple spreadsheet and input totals. Each five-gallon bucket holds about 30 pounds of oyster shell. From September 2015 through February 2016 we have collected over 5500 pounds of shell. This tallying method makes for easier projection and analysis of the program’s success.

While collecting the oyster shell is an important part of recycling process, it’s only half of the recycling circle. Having a plan in place on what’s going to happen with the shell is extremely important. In June of 2016, we plan to fill about 30 mesh bags with shell and hang them from boat docks to collect spat, which we’ll later plant on our recreational shellfishing area. We also plan on spreading the collected shell on the sea floor near our existing recreational oyster bed to create the foundation for new beds and promote growth.

There are many challenges that we need to tackle in the coming months and we are currently working out all the details of our plan. One of our biggest challenges will be getting several tons of oyster shell from our storage area into the water around our recreational oyster bed. It’s going to require a coordinated effort between our Shellfish Commission, Conservation Department



The three bay oyster shell storage area in Fairfield, CT.

Photo: Tim Macklin



and might require partnering with a local commercial shellfishing boat, but we are confident we'll complete the job and continue the program for years to come.

Though it would be ideal for Sea Grant, UConn, and other organizations to get involved in developing a statewide oyster shell recycling program, before that partnership is forged, each coastal town's Shellfish Commission should take the first steps to create their own program. When the benefits become apparent, these results can be used to collectively petition the state and other organizations to contribute to the revitalization effort, which has widespread economic impact on the entire region. It not only helps to conserve the shoreline and promote recreational shellfishing, it also aids the restaurant industry with reducing waste and promotes the sales and consumption of local oysters.

Long Island Sound provides us with millions of beneficial and tasty oysters each year, so it is only fair we engage in responsible conservation efforts. It's time we started giving oysters, or at least their shells, back to the Sound and help complete the full life cycle of the oyster.

There was one other unexpected benefit for me in getting this recycling project going – the Sundays I get to spend with my son Max, picking up all those buckets of shell. I look forward to that voice from the back seat “Dad...these shells are really stinky” but that doesn't bother us too much, we're just happy to be together.

This project is a collaborative effort of the Fairfield Shellfish Commission members: Robert W. Bilek, Deborah Wetmore Detmer, Richard E. Ferrari, Tim Macklin, Alison Savona, John Short, and Sanford Wakeman.

#### ABOUT THE AUTHOR

*Tim Macklin is a member of the Fairfield Shellfish Commission.*



Tim's son Max Macklin helps out moving a bucket of oyster shells to the storage area.  
Photo: Tim Macklin



# What's a Clam Worth?

## Greenwich wants to know.

by Mark S. Dixon, Julie M. Rose, Anthony Dvarskas, Roger Bowgen and Gary H. Wikfors.

### What's a clam worth?

This seemingly simple question may actually be more interesting and complex than expected. Historically we have valued clams as currency, traded them as a commodity, and even assigned a dollar equivalency through vernacular slang.

The clam in question is the northern quahog, *Mercenaria mercenaria*; or as we call it locally, the hard clam. It is a commercially important species found along the entire east coast of the United States, living in the seafloor of shallow bays and estuaries. Clams and other shellfish filter phytoplankton and other small particles out of the water as they feed and breathe, leaving behind an environment that is cleaner and clearer.

Now a group of scientists from the NOAA National Marine Fisheries Service lab in Milford Connecticut, Roger Bowgen from the Town of Greenwich Shellfish Commission, and Anthony Dvarskas, an environmental economist at Stony Brook University, are conducting a study to determine the overall economic value of clams to this coastal community. Their goal is to answer: What is the total dollar value of the commercial and recreational harvest of clams to the Town of Greenwich? What is the ecological value of the water quality improvements that the town's clam population provides and how does that translate into a dollar value?

### Clam Commercial and Recreational Harvest

Commercial harvesters and aquaculturists harvest clams as part of a business model. The clams are sold as commodities, much like any produce. The value of commercially harvested clams relies heavily upon consumer confidence in the product and in water quality, and the cachet associated with a local product.

Recreational harvesters can purchase a permit to gather clams, under strictly controlled circumstances, for personal consumption. The perceptions of good water quality and pride in the shellfish heritage in Greenwich play important roles in residents' appreciation for, and participation in, recreational harvest.

Both manners of harvest generate direct and ancillary income for the town and support the local economy. Commercial harvesters pay lease fees to the town for their grounds, pay taxes, own or lease a land-based facility, and pay dock fees. They consume fuel, maintain vessels and equipment, employ workers, and buy equipment and supplies. Commercial harvesters are also earning a living and supporting families in the community. Recreational harvesters buy permits from the town and support local business by buying equipment and supplies.

Commercial harvesters have access to over 1200 acres available to lease from the Town of Greenwich and almost 4000 acres in state waters. Recreational harvesters can access



A group of NOAA scientists and members of the Town of Greenwich Shellfish Commission survey recreational shellfish grounds in Greenwich Connecticut. This was an important part of the process of planning and organizing several research projects with the goal of determining the value of shellfish resources to the coastal community. Photo: Mark Dixon



660 acres of public grounds via the shoreline.

Most of these dollars can be tracked directly and often are part of the public record. Some of the ancillary benefits are more difficult to estimate. One aim of the project is to assist the Greenwich Shellfish Commission and resource economists in quantifying the direct and indirect financial benefits that the town gains from its commercial and recreational clambers.

**FUN FACT: Greenwich sells approximately 250 recreational shellfish permits every year**

## Ecosystem Services

The term “ecosystem services” refers to the suite of physical, chemical, and biological benefits provided by healthy shellfish resources in estuaries and coastal waters. These include, but are not limited to: creating habitat for fish, barnacles, seaweed, and other marine organisms; stabilizing shorelines and sediment; improving water clarity by filtering particles from the water; linking life on the seafloor with food from the water above, and removing excess nitrogen and other nutrients from the water (an article on shellfish ecosystems services was featured in the spring/summer 2014 edition of *Wrack Lines*).

As part of this project, NOAA scientists measured two of these ecosystem services provided by clams in Greenwich during summer 2015. First, they examined the type and quantity of clam food and other particles in Greenwich waters and then measured how much material clams removed from local waters. Results showed that the water in Greenwich is highly suitable for supporting clams and other shellfish; and that the clams are effective filterers that help to “clear” the waters. Second, by adding some chemistry to the clam experiments, scientists also measured

the amount of nitrogen that clams removed from Greenwich waters. Nitrogen is an essential nutrient for living organisms; however, many coastal areas have become overloaded with nitrogen from land sources such as fertilizers and wastewater treatment plants. Excess nitrogen can lead to a range of environmental problems, such as the overgrowth of seaweeds, algal blooms, and fish kills. Shellfish consume lots of this nitrogen by feeding on plankton and when harvested, the nitrogen is effectively removed from the system. Results indicated that clams are removing a great deal of nitrogen from Greenwich waters, which improves water quality. The second aim of this project is to put a dollar value on this service the clams provide to the ecosystem.

**FUN FACT: Hard clams can live for 40 years**

## Socioeconomic Benefits

This research project will also examine the connection between water quality in Greenwich and the value locals place on their coastal resources. Ecosystem services often are described as the benefits that nature provides “at no charge” to humans. These include clean water for swimming, clean fish for consumption, and aesthetic benefits associated with a water view, among others. Professor Anthony Dvarskas, an environmental economist at Stony Brook University, is working to identify the human beneficiaries of the ecosystem services provided by clams in Greenwich and surrounding communities. Beneficiaries may include recreational users who appreciate being able to harvest a bucket of clams; homeowners who benefit from residing near water that is clearer because of filtration of water by shellfish, and shellfishing businesses who rely on

good water quality as a part of their business plans.

By having a fuller understanding of the number of beneficiaries, the researchers can calculate the potential value associated with ecosystem services such as nitrogen reduction and improved water clarity attributable to clam filtration. The results will help inform planning and management decisions by local, state, and federal stakeholders. The lessons learned from the work being conducted in Greenwich can be replicated in other communities along the Connecticut shoreline.

**FUN FACT: Clams are marketed by size, with names like Littlenecks, Cherrystones, Topnecks and Chowders**

## What’s Next

This work is a pilot study to develop an approach that can be used in other towns around the country, and with other species besides clams. The Town of Greenwich Shellfish Commission plans to incorporate the results of the ecological and socioeconomic research described above into ongoing educational programs with schools and the public. They will also share the results with Town of Greenwich officials in other departments so that land-based planning decisions consider potential impacts to shellfisheries. Additionally, the shellfish commission plans to host a presentation of the results to the public at the Bruce Museum (Greenwich, Connecticut) later this year.

Because of the value of ecosystem services a clam in the sand may be worth as much as one in the hand.

### ABOUT THE AUTHORS:

*Mark Dixon, Julie Rose, and Gary Wikfors are researchers at the NOAA Fisheries Laboratory in Milford, Connecticut. Anthony Dvarskas is a professor and environmental economist at Stony Brook University. Roger Bowgen is Chair of the Greenwich Shellfish Commission.*





Clams are sorted from other shellfish and sea creatures, and sediment and rocks as they come aboard a commercial clam boat plying the waters off Greenwich, Connecticut. The clams will be cleaned, sorted by size, and bagged for market. Photo: Julie Rose



# CATCHING VALUE:

## An Economic Assessment of Connecticut Recreational Shellfish Harvest

by Di Yang and Robert Pomeroy

As the tide comes in, a man wearing a faded shirt, shorts, and waders trudges through the thigh-high water towards the beach. He's toting a long basket rake, a flotation tube on a rope, and a bucket. His grandson, similarly garbed, examines the contents of the bucket and squeals in delight. Their expressions show utter contentment, imagining tonight's clam dinner. Some on the half shell, maybe some with linguine, some for chowder.

Every summer thousands of people flock to the shore to engage in this favorite salty pastime—recreational shellfishing. There are also some diehard enthusiasts who venture out in harsh winter weather just to dig their dinner. Connecticut has a long, rich history and tradition of shellfishing dating back to the Colonial period, and the passion for this bountiful marine resource still continues.

Many have been continuing this tradition on through generations of family, learning and passing on techniques from their elders. This activity is clearly rewarding to the people who do it. What the value of this activity is to Connecticut's economy is a much bigger question, however, and we wanted to find out the answer.

Recreational shellfish harvest opportunities exist in most coastal Connecticut towns—14 to be exact. Municipal shellfish commissions manage this local harvest of clams, oysters, mussels and scallops in collaboration with the State Department of Agriculture's Bureau of Aquaculture (DA/BA) and the commercial shellfishing industry. These groups continuously sample and monitor water quality and stock harvest areas for the public. Recre-

ational fishing supports the economy mainly through the sale of permits, harvest tools, and fuel. The Connecticut Department of Energy and Environmental Protection (DEEP) estimated the average economic value for the entire Long Island Sound recreational fishery between 2000 and 2004 was \$149.3 million. What we set out to do was understand the economic contribution of public shellfish harvest.

### Catching Value

To better understand the economic value of this important recreational resource to the state and ensure its continued productivity, University of Connecticut economists and Sea Grant Extension staff are undertaking the first statewide economic assessment of recreational shellfishing. The purpose is to place a dollar value on the economic importance of recreational shellfishing in Connecticut. Although the focus of this phase of the study is on economic analysis of the recreational shellfishing, we are also collecting data on commercial shellfishing and other aspects of the municipal management of shellfisheries.

The recreational shellfishing study is being undertaken through a four-step process:

1. Survey of municipal shellfish commissions to obtain information on municipal contact persons, permits and permit records
2. Collect permit data from municipal shellfish commissions on permits sold, type and fee
3. Survey of recreational shellfish permit vendors and wardens to assess spending by permit holders
4. Survey of recreational shellfishing permit holders on spending

Of the 19 shellfish commissions active in 2014, we decided to focus the study on 13 municipalities with large recreational shellfishing programs. This included Branford, Darien, East Lyme, Fairfield, Greenwich, Groton, Guilford, Madison, Norwalk, Stonington, Waterford, Waterford-East Lyme and Westport.



John Short and son shellfishing in Fairfield.  
Photo: Tessa Getchis



In 2014 and 2015, we surveyed town recreational shellfish commissions to identify the types of permits issued, what permit records were kept, and what information they collected from permit holders. We found out that while two towns had only kept records for five years, the average record-keeping timespan was eight years (see table below). Stonington had the longest continuous record history, with 11 years, from 2005 to 2015. Fortunately, permit records are available for all 13 towns from 2011 to 2014. This wide variation in record-keeping posed a challenge; however the information still provided important insights.

A follow-up survey requested permit sales by type and price data. The table on the next page lists the permit sales and value range by town for the years 2005 to 2015. “Sales” indicates the total number of permits sold, while “value” is a sum of the total permits sales times the price per permit. From an aggregate perspective, we see a clear upward trend for both permit sales and permit value for the years 2005 to 2014 (the data for 2015 are only available for five towns, so the aggregate is not comparable with other years). In 2007, a more than 30 percent increase occurred in both permit sales and permit value. With such a significant increase on the demand side, several municipalities started to increase the permit price, and that brought a 53 percent increase in the permit value in 2008. The increased price didn’t slow the demand for recreational shellfishing, and permit sales increased about 35 percent in 2008. The permit sales and value peaked in 2012 and 2010, respectively, with over 6,500 permits sold and over \$1.4 million dollars earned by the 13 towns. Some reasons for fluctuations in permit sales include weather trends, for example, in years with excessive summer rainfall permit sales may decrease.

When viewed at the town level, the top three towns with annual average permit sales are Groton (1589), Guilford (1016), and Westport (845). The towns of Guilford (\$39,769), Groton (\$29,468), and Westport (\$15,617) rank as the top three in annual average permit value.

“With the value of recreational harvest known and trends in permit sales available, municipalities can now better plan for stock enhancement and business management” said Tessa Getchis, extension educator with Connecticut Sea Grant. When the results were shared with commission members at a recent meeting that Getchis organized, some commission members were already considering changes in the types and prices of permits they planned to offer in the future.

Looking at the big picture, a recent study by Connecticut Sea Grant estimated the total economic impact of the maritime sector in Connecticut was nearly \$7 billion in 2010 (approximately \$2,000 per Connecticut resident). Connecticut’s maritime economy contributed nearly 40,000 jobs to the state. The total value-added impact at the state level is \$4 billion. While only a small part of this economic value, recreational shellfishing is an important activity to coastal residents and visitors in the state. The next phase of the study will examine the indirect, or multiplier effects, of recreational harvest.

At last, we will be able to put a tangible value on Connecticut’s recreational shellfishing activities, to appreciate along with Grandpa’s clam chowder.

#### ABOUT THE AUTHORS

*Di Yang was a research assistant working Connecticut Sea Grant, now an intern at the World Wildlife Foundation.*

*Robert S. Pomeroy is a professor of Agricultural and Resource Economics at UConn and a fisheries specialist with Connecticut Sea Grant.*

*continued on next page...*

## RECREATIONAL SHELLFISHING PERMIT DATA AVAILABILITY BY TOWN

Stonington	Branford	Fairfield	Guilford	Darien	WELSCO	East Lyme	Westport	Waterford	Groton	Norwalk	Greenwich	Madison
2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006
2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008
2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009
2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
2011	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011
2012	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012
2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013
2014	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014
2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015

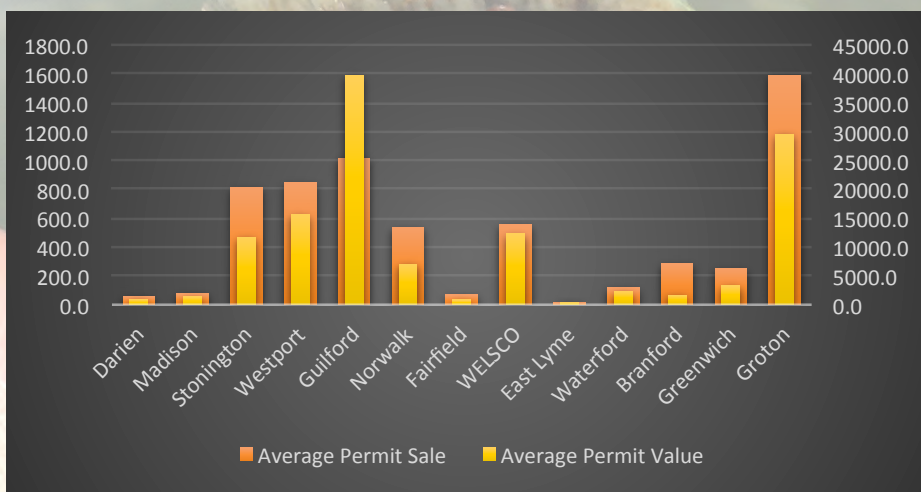
Shaded areas indicate data not available.

\*WELSCO stands for the Waterford-East Lyme Shellfish Commission





Total permit sales and value for all 13 towns, by year.



Average permit sales and value for each town, over the study period.

**Over the last five years**  
 permit sales alone for  
 recreational shellfishing  
 generated more than  


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**\$100,000**  


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 in revenue for local  
 economies.



# A Chilling Discovery

*An oyster farmer and a state agency tag team to give a KO Punch to Vibrio*

by Peg Van Patten

"We saw the train coming our way," Jimmy Bloom said, "and we got ready to move." The young businessman was not talking about transportation. We were sitting in the Norm Bloom & Son oyster company's upstairs room, looking out at the company boats and the glittery winter sunlight on the surface of Long Island Sound. Bloom was talking about the reaction of his family-owned shellfish business in Norwalk, Connecticut, when he and father Norm Bloom learned about an outbreak of *Vibrio parahaemolyticus* that was taking place across the Sound in Oyster Bay, New York, in 2012.

This type of *Vibrio* infection in humans usually manifests as mild to moderate gastrointestinal illness, often resulting from eating raw or undercooked shellfish such as oysters, clams and other types of seafood. In very rare cases, severe systemic infection can occur. Illnesses usually occur during the warmer summer months as the bacteria can multiply at higher temperatures.

Then everything changed. A series of heat waves in the northeast during 2013 drove seawater temperatures up. At the same time, a particularly virulent strain of *V. parahaemolyticus* was spreading throughout coastal waters in the region. The coincidence of these two events resulted in an unprecedented number of illnesses, 23 in Connecticut alone.

In order to prevent additional illnesses, shellfish beds in Norwalk and Westport were closed. Portions of the

beds remained closed for as long as eight weeks in the late summer of 2013, and the industry implemented a voluntary recall of product. Illnesses were likely prevented by the rapid response to the situation, but the shellfish industry took a big hit economically.

*Vibrio*, mind you, is not some toxic microbe that sneaks in to attack defenseless shellfish and humans. It is actually a very common naturally-occurring bacterium, always present in brackish or salt water. There are many different strains, most of which are benign and harmless to either humans or shellfish.

"The oysters filter these bacteria as part of their natural feeding process," Bloom explained. "But once you take the oysters out of the water, and they are no longer filtering, the bacteria in the oysters increases rapidly as their temperatures rise."

"*V. parahaemolyticus* has one of the fastest growth rates of all estuarine bacteria, and a population can double every hour at 90°F", said Kristin DeRosia-Banick, environmental analyst with the Connecticut Department of Agriculture Bureau of Aquaculture. "We have known about these bacteria for many years," she said, "however, with the appearance of new virulent strains, more proactive strategies have been needed in order to prevent illnesses."

The new strategy for managing this bacteria is called "rapid cooling ice slurry." It involves submerging oysters in a slurry of ice immediately after they are harvested. This rapid cooling process is capable of reducing the internal temperature of oysters to <50°F within 1 hour of the time of harvest."

Here's how it works. Oysters are placed into large insulated con-

tainers. Once the ice slurry container is filled with oysters, the box is sealed with a cover and oysters remain in the slurry until they are cooled.

"This 50 degree limit is the point at which the *V. parahaemolyticus* growth is greatly minimized, so that is the temperature that we require all shellfish to be cooled to regardless of what method of cooling is used," said DeRosia-Banick.

Following the 2013 outbreak, both regulators and shellfish harvesters realized that standard mechanical cooling practices were not preventing illnesses. "We realized that the measures that we were taking weren't enough" said Bloom.

"Initially we tried using ice alone to cool the oysters. That really didn't work well for us, because the oysters on top could freeze, while the oysters on the bottom could be too warm" explained Bloom. The new rapid cooling method which utilizes ice slurry provides more uniform results in oyster temperatures throughout the container. Using the new process, cooling time is reduced to a mere half hour, or less. "The ice slurry chills the oysters down to 40 degrees in about ten minutes from the time of harvest" Bloom said.

In order to make this new cooling process work for their large scale operation, the Blooms needed to be able to dredge primarily market-size oysters, and minimize the harvest of sub-market sized oysters. Typically, a harvester would plant their beds with a mixture of all sizes and age classes of oysters. To make the ice slurry cooling method efficient, oysters are culled and sorted early on in the transplanting process. Oysters are planted on prepared underwater beds according to age and size. Several beds are designated for mature, market-

*continued on next page...*





A.



B.



C.

# The Rapid Chill Process

A. Ice is added to containers.

B. Water is added to make the chilling slurry to surround all of the oysters.

C. The slurry is ready for use.

D. Market sized oysters are transferred to the chilling slurry. Photo: Tessa Gethis



D.





E.

E. Temperature sensors record the internal temperature of a random oyster.



F.

F. Returning to the dock.



G.

G. Unloading the oysters at the dock.

A-C and E-H Photos: Peter Massini/Bloom and Son

**"The oysters filter these bacteria as part of their natural feeding process," Bloom explained. "But once you take the oysters out of the water, and they are no longer filtering, the bacteria in the oysters increases rapidly as their temperatures rise."**



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ready oysters in preparation for the warmer months, while others are planted with sub-market sized oysters which may not be harvested for months to years. This may sound like a lot of work, but once the size classes are separated by lot, it makes it easier to harvest only marketable oysters.

Once the vessel hits the dock, cages holding cooled oysters are quickly moved into a refrigerated building. In this refrigerated processing room, oysters are subjected to a final grading step, washed free of sediment with refrigerated water, then packed and stored under refrigeration until loaded onto refrigerated trucks and brought to market.

In 2015, the Department of Agriculture was funded by the Interstate Shellfish Sanitation Conference to conduct a study on the effectiveness of various post-harvest treatments on the growth of *V. parahaemolyticus*. The Department worked closely with harvesters, subjecting oysters to field experiments using several combinations of cooling approaches.

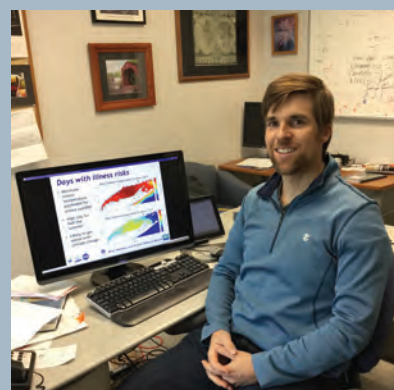
DeRosia-Banick confirms that rapid cooling using an ice slurry is highly

effective at minimizing post-harvest growth of the bacteria. “Connecticut has achieved an outstanding illness reduction rate of 95%, a finding which backs up the experimental data with a significant and meaningful public health outcome.”

Retailers and consumers benefit from a safe, high-quality, fresh oyster product that they can trust. Given the successful implementation of this innovative method for rapid cooling, a number of other shellfish businesses in Connecticut have adopted similar rapid cooling strategies in order to help ensure the safety and quality of their shellfish.

#### ABOUT THE AUTHOR:

*Peg Van Patten edits Wrack Lines and is communications director for Connecticut Sea Grant.*



A related Sea Grant-funded research project is underway, led by Mike Whitney, marine scientist at the University of Connecticut. The project team will analyze observations of *V. parahaemolyticus* samples taken in Connecticut oyster-growing locations, and incorporate them into a hydrodynamic computer model. Combining these observations with data on the physical properties of Long Island Sound waters, such as variations of temperature, salinity and flow, will provide a good estimation of exactly when and where *Vibrio* might concentrate enough to be a threat. Marine scientist Evan Ward and environmental analyst Kristin DeRosia-Banick are part of the project team.

If the model proves to be accurate, identifying high risk periods for *V. parahaemolyticus* in prime commercial growing areas could “further narrow the window” of concern during which more intensive controls such as rapid cooling are required, reducing the burden on the industry.



H. Sorted oysters in cooled room, packaged for sale.





Learn how to dig for your dinner and some fun facts about Long Island Sound and its shellfish treasures! Photo: Alison Savona

# Community Events 2016

June 11, 12  
&  
Sept. 24, 25

## **MADISON CLAM DIG**

Open to the public  
Surf Club, Madison  
[madisonct.org/191/shellfishcommission](http://madisonct.org/191/shellfishcommission)  
[madisonshellfishcommission@gmail.com](mailto:madisonshellfishcommission@gmail.com)

August 20

## **MILFORD OYSTER FESTIVAL**

Open to the public  
[milfordoysterfestival.org](http://milfordoysterfestival.org)  
(203) 878-5363

June 11

## **FAIRFIELD CLAM CLINIC**

Open to Fairfield residents  
Sasco Hill Beach  
[fairfieldct.org/shellfishcommission](http://fairfieldct.org/shellfishcommission)  
(203) 256-3071

September  
10-11

## **NORWALK OYSTER FESTIVAL**

Open to the public  
[seaport.org/Oyster-Festival](http://seaport.org/Oyster-Festival)  
(203) 838-9444

June 26

## **GREENWICH EXPERIENCE THE SOUND**

Open to the public  
Greenwich Point Park  
[experiencethesound.org](http://experiencethesound.org)  
(203) 622-7835

October 1

## **MYSTIC RIVER OYSTER FESTIVAL**

Open to the public  
[mysticseaport.org](http://mysticseaport.org)



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A commercial shellfish boat returning to harbor, in Greenwich Connecticut, after a full day of harvesting.  
Credit: Hemlock Oyster Company

[www.seagrants.uconn.edu](http://www.seagrants.uconn.edu)